LIMITED CIRCULATION

This paper is not an official document; it is for information only and must not be quoted in any printed publication.

AGRICULTURAL MEMORANDUM NO. 1003

# THE FRESH WEIGHT OF WINTER BARLEY IN LATE WINTER IN RELATION TO THERMAL TIME

by M N Hough

Memorandum No. 1002 described the relations between leaf number and thermal time for winter barley. The first six leaves or so, are about the same size and so the leaf area which is achieved at any point should be nearly proportional to the thermal time from sowing. Light interception depends very much on the leaf area when the leaf area is small, and so there ought to be a relation between the weight of plants and thermal time up to about leaf six.

Data on fresh weight of winter barley were available from several sites in Yorkshire between 1980-82. Air temperatures were also available at some of the sites and thermal time was calculated. The graph shows the relation between fresh weight of the crop in mid February and thermal time from sowing for the years 1981 and 1982. The year 1980 had to be omitted since there appeared to be large variations in established plant populations which markedly affected the weights. For comparison the weight of seed sown was about 0.1 t/ha so that even the least developed crops had put on some weight. The graph shows that fresh weight did not start to increase until 400-500° cd had accumulated, but at higher thermal times the fresh weight increased steadily, though not linearly.

## DISCUSSION

The graph shows a useful relation between weight and temperature. As was mentioned above large variations in plant populations could cause discrepancies since when the plants are small the leaf area clearly depends upon the number of plants present. No allowance has been made for variations in solar radiation income. December and January in 1980/81 and 1981/82 all reported near normal or above average sunshine hours; the major difference between the two seasons was the extremely cold period in December/January in 1981/82. This caused smaller thermal times by February 1982 and was reflected in the lower fresh weights.

Data for early and late sowings lie on the same line. Much of the grain yield difference at the final harvest between early and late sown crops could be attributed to the differences in the size of plants in early spring. A cold winter, or a cold site (eg the chalk site, High Mowthorpe EHF) tended to reduce the differences between early and late sowings. For example if the early sowing had achieved 600°cd and the late sowing 400° cd then the difference in fresh weight from the graph is about 1 t/ha. If the thermal times were 800 and 600° cd then the difference in weights is 2 t/ha. This may explain why winter barley is so sensitive to sowing date, and why in some years the difference in grain yield between early and late sown crops is reduced. The growing conditions after late winter may also be important. If they are unfavourable (eg cold) then both crops grow poorly which again tends to reduce the difference between sowings.

Met Office
Harrogate
November 1983

THE RELATION BETWEEN CROP FRESH WEIGHT IN MID FEBRUARY AND THERMAL TIME FROM SOWING.